UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/758,054	01/15/2004	Rahul Garg	1864.003US1	5115

7590 04/20/2007

Global IP Services, PPLC
c/o PortfolioIP
P.O. Box 52050
Minneapolis, MN 55402

EXAMINER	
FLORES, LEON	
ART UNIT	**PAPER NUMBER**
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/20/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

SK

Office Action Summary	Application No.	Applicant(s)	
	10/758,054	GARG ET AL.	
	Examiner	Art Unit	
	Leon Flores	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 15 January 2004.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-26 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-26 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 15 January 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims (1-26) are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

3. The limitation, "non-uniform Rake filter" claimed in each independent claim has not been explained in the specification. The applicant fails to specifically show that difference between a conventional uniform rake filter and a non-uniform rake filter. Therefore, it is not clear to the examiner what the applicant is trying to contemplate with this limitation. However, for the purpose of art consideration on the merits, the examiner will construed this limitation as a rake filter having different tap spacing.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims (1-26) are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

6. The limitation, "non-uniform Rake filter" claimed in each independent claim, is indefinite. The applicant fails to specifically show that difference between a conventional uniform rake filter and a non-uniform rake filter. Therefore, it is not clear to the examiner what the applicant is trying to contemplate with this limitation. However, for the purpose of art consideration on the merits, the examiner will construed this limitation as a rake filter having different tap spacing.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims (1-26) are rejected under 35 U.S.C. 103(a) as being unpatentable over Dent et al (hereinafter Dent) (US Patent 5,572,552) in view of Wang (US Publication 2005/0152486 A1), and further in view of Khayrallah et al (hereinafter Khayrallah) (US Publication 2005/0130616 A1).

Re claim 1, Dent discloses a Rake receiver comprising: a Rake filter coefficient estimator that computes channel coefficients of each received channel component, wherein the Rake filter coefficient estimator computes a Rake filter coefficient for each estimated channel coefficient (See col. 4, lines 53-65, including equation 4. The conjugate of a(k) is the filter's coefficients derived from the channel tap coefficients.), and an adaptable non-uniform Rake filter including multiple non-uniform tap delay filters to extract delay information from each selected Rake filter coefficient and to configure structure of the multiple non-uniform tap delay filters. (See col. 4, lines 53-65. The conjugate of a(k) is the filter's coefficients derived from the channel tap coefficients. The channel tap coefficients contain information regarding the amplitude and phase shifts of the propagation path "channel" that the received signal traveled. Therefore, according to equation 4 & 5, the filters coefficients are able to extract this information from the channel tap coefficients so as to compensate for the channel impairments.)

But the reference of Dent fails to specifically disclose that the rake filter is a non-uniform rake filter. However, Wang does. (See paragraph 70) Wang discloses a non-uniformly spaced LMMSE receiver with an LMMSE filter. Such a receiver is amore general version of an L-rake receiver.

Therefore, taking the combined teachings of Dent and Wang as a whole. It would have been obvious to one of ordinary skill in the art to have modified the system of Dent, in the manner as claimed and as taught by Wang, for the benefit of optimizing the signal to noise ratio. (See paragraph 138)

The combination of Dent and Wang disclose the limitation as claimed, except they fail to specifically disclose that wherein the Rake filter coefficient estimator selects one or more Rake filter coefficients from the estimated channel coefficients based on channel characteristics.

However, Khayrallah does. (See paragraph 59) Khayrallah discloses a rake processor comprising a combining weight parameter and a finger placement processor. The former generates weights based on the channel coefficients of the propagation paths associated with each signal image.

Therefore, taking the combined teachings of Dent, Wang & Khayrallah as a whole. It would have been obvious to one of ordinary skill in the art to have incorporated this feature into the system of Dent, as modified by Wang, in the manner as claimed and as taught by Khayrallah, for the benefit of compensating for multi-path interferences.

Re claim 2, the combination of Dent, Wang, and Khayrallah further discloses that wherein the Rake filter coefficient estimator selects the one or more Rake filter coefficients based on channel components having a most signal energy. (In Khayrallah, see fig. 3: 162 & paragraphs 34 & 52)

Re claim 3, the combination of Dent, Wang, and Khayrallah further discloses that wherein the Rake filter coefficient estimator selects a Rake coefficient having the most signal energy as a primary Rake filter component from the one or more Rake filter coefficients, wherein the Rake filter coefficient estimator applies a weighted criteria for selection of Rake coefficients corresponding to channel components occurring before and after the primary Rake filter component. (In Khayrallah, see fig. 3: 154 & paragraph 60)

Re claim 4, the combination of Dent, Wang, and Khayrallah further discloses that wherein the Rake receiver applies the weighted criteria based on knowledge of a specific scenario of a Rake receiver application. (One skilled in the art would know that the weight selection is solely based on the type of propagation path the receiver is being exposed to.)

Re claim 5, the motivation for combining these references has already been established in claim 1 above, therefore, the combination of Dent, Wang, and Khayrallah further discloses a Rake receiver for receiving one or more channel components from a transmitter and outputting a channel matched signal comprising: a channel coefficient module that estimates channel coefficients of each received channel component from the transmitter (In Dent, see col. 4, lines 41-42); a Rake filter coefficient module that computes a Rake filter coefficient for each estimated channel coefficient (In Dent, see col. 4, lines 53-65); a Rake coefficient selector that selects one or more Rake filter

coefficients from the computed Rake filter based on channel characteristics (In Khayrallah, see paragraph 59); and an adaptable non-uniform Rake filter that extracts delay information from each selected Rake filter coefficient on a real time basis and configures structure of non-uniform tap delay filters, (In Dent, see col. 4, lines 53-65. The conjugate of a(k) is the filter's coefficients derived from the channel tap coefficients. The channel tap coefficients contain information regarding the amplitude and phase shifts of the propagation path "channel" that the received signal traveled. Therefore, according to equation 4 & 5, the filters coefficients are able to extract this information from the channel tap coefficients so as to compensate for the channel impairments.) and wherein the adaptable non-uniform Rake filter combines the one or more channel components with associated delay information using the configured adaptable non-uniform Rake filter and outputs the adaptively channel matched signal. (In Khayrallah, see fig. 1. Furthermore, one skilled in the art would know that the filter coefficients are used to compensate for multi-path interferences, and that the output of the rake combiner is a channel matched signal.)

Re claim 6, the motivation for combining these references has already been established in claim 1 above, therefore, the combination of Dent, Wang, and Khayrallah further discloses an SNR estimator that estimates SNR (signal-to-noise ratio) (In Khayrallah, see paragraph 68); and an SNR/Delay spread based selector that compares each of the selected one or more Rake filter coefficients to a first threshold SNR value with respect to the channel component having the most signal energy (In

Khayrallah, see fig. 4B: 307, and paragraph 44.), wherein the adaptable non-uniform Rake filter selects a subset of Rake filter coefficients from the selected one or more Rake filter coefficients such that each of the one or more Rake filter coefficients in the subset have a signal energy higher than or equal to the first threshold SNR value with respect to the channel component having the most signal energy.(In Khayrallah, see paragraph 52.)

Re claim 7, the motivation for combining these references has already been established in claim 1 above, therefore, the combination of Dent, Wang, and Khayrallah further discloses a delay spread estimator to determine a channel spread using the input signal, wherein the SNR/Delay spread based selector compares the determined channel spread to a threshold spread value (In Khayrallah, see fig. 4B: 307, and paragraph 44.), wherein the adaptable non-uniform Rake filter does switches to a default Rake filter when the determined channel spread is below the threshold spread value. (In Khayrallah, see fig. 4B: 307 & 308. In this level, element 308 was not selected due to its energy level being less than a threshold. However, element 307 was selected due to its energy level being greater than a threshold.)

Re claim 8, the motivation for combining these references has already been established in claim 1 above, therefore, the combination of Dent, Wang, and Khayrallah further discloses wherein the Rake coefficient selector further selects default Rake filter coefficients from the selected subset of Rake filter coefficients and switches to a default

Rake filter based on estimated SNR obtained from the SNR estimator (In Khayrallah, see fig. 4B: 307 & 308. In this level, element 308 was not selected due to its energy level being less than a threshold. However, element 307 was selected due to its energy level being greater than a threshold.), wherein the SNR/Delay spread based selector compares the estimated SNR to a second threshold SNR value and configures the adaptable non-uniform Rake filter structure using the default Rake filter coefficients when the estimated SNR is below the second threshold SNR value. (In Khayrallah, see fig. 4B: 307 & 308 & paragraph 60 "processor may select candidate....from a lower state".)

Re claim 9, the motivation for combining these references has already been established in claim 1 above, therefore, the combination of Dent, Wang, and Khayrallah further discloses a Rake receiver using an adaptable non-uniform tap delay filters comprising: a channel coefficient module estimates channel coefficients of each received channel component from a transmitter (In Dent, see col. 4, lines 41-42); a Rake filter coefficient module computes a Rake filter coefficient for each estimated channel coefficient (In Dent, see col. 4, lines 53-65); a Rake coefficient selector selects one or more Rake filter coefficients from the computed Rake filter based on channel characteristics (In Khayrallah, see paragraph 59); an adaptable non-uniform Rake filter extracts delay information from each selected Rake filter coefficient on a real time basis and to configure structure of non-uniform tap delay filters (In Dent, see col. 4, lines 53-65. The conjugate of a(k) is the filter's coefficients derived from the channel tap

coefficients. The channel tap coefficients contain information regarding the amplitude and phase shifts of the propagation path "channel" that the received signal traveled. Therefore, according to equation 4 & 5, the filters coefficients are able to extract this information from the channel tap coefficients so as to compensate for the channel impairments. Furthermore, these coefficients are used mainly to adaptively and iteratively update the parameters in the filter.), and wherein the adaptable non-uniform Rake filter to combine the one or more channel components with associated delay information using the configured adaptable non-uniform Rake filter and to output a adaptively channel matched signal (In Khayrallah, see fig. 1. Furthermore, one skilled in the art would know that the filter coefficients are used to compensate for multi-path interferences, and that the output of the rake combiner is a channel matched signal.); and a demodulator to receive the adaptively channel matched signal and to output a decoded signal.(In Khayrallah, see paragraph 27. "wireless receiver 100 may be embodied in any wireless device, such as a base station or a mobile terminal". Furthermore, one skilled in the art would know that the "wireless receiver 100" would have necessitated some kind of demodulator/decoder to decode the received signal.)

Re claim 10, the motivation for combining these references has already been established in claim 1 above, therefore, the combination of Dent, Wang, and Khayrallah further discloses that wherein the adaptable non-uniform Rake filter configures register structures of the non-uniform tap delay filters. (In Dent, see col. 4, lines 53-65. The conjugate of a(k) is the filter's coefficients derived from the channel tap coefficients.

The channel tap coefficients contain information regarding the amplitude and phase shifts of the propagation path "channel" that the received signal traveled. Therefore, according to equation 4 & 5, the filters coefficients are able to extract this information from the channel tap coefficients so as to compensate for the channel impairments. Furthermore, these coefficients are used mainly to adaptively and iteratively update the parameters in the filter.)

Re claim 11, the motivation for combining these references has already been established in claim 1 above, therefore, the combination of Dent, Wang, and Khayrallah further discloses that wherein the adaptable non-uniform Rake filter configures structure of multiplier bank of the non-uniform tap delay filters. (In Dent, see col. 4, lines 53-65. The conjugate of a(k) is the filter's coefficients derived from the channel tap coefficients. The channel tap coefficients contain information regarding the amplitude and phase shifts of the propagation path "channel" that the received signal traveled. Therefore, according to equation 4 & 5, the filters coefficients are able to extract this information from the channel tap coefficients so as to compensate for the channel impairments. Furthermore, these coefficients are used mainly to adaptively and iteratively update the parameters in the filter.)

Claim 12 has been analyzed and rejected w/r to claim 5 above.

Claim 13 has been analyzed and rejected w/r to claim 10 above.

Claim 14 has been analyzed and rejected w/r to claim 11 above.

Re claim 15, the motivation for combining these references has already been established in claim 1 above, therefore, the combination of Dent, Wang, and Khayrallah further discloses a system comprising: a bus (In Khayrallah, see fig. 1: the lines connecting each element to each other); a processor coupled to the bus (In Khayrallah, see fig. 1: the processor 150 is connected to other elements by means of buses); a memory coupled to the processor (In Khayrallah, see fig. 1: one skilled in the art would know that memory chips are an inherent elements within processors); a network interface coupled to the processor and the memory; and a Rake receiver coupled to the network interface and the processor ((In Khayrallah, see fig. 7: receiver 100 is coupled to other antennas to form a network), wherein the Rake receiver further comprising: a channel coefficient module estimates channel coefficients of each received channel component from a transmitter (In Dent, see col. 4, lines 41-42); a Rake filter coefficient module computes a Rake filter coefficient for each estimated channel coefficient (In Dent, see col. 4, lines 53-65); a Rake coefficient selector selects one or more Rake filter coefficients from the estimated channel coefficients based on channel characteristics (In Khayrallah, see paragraph 59); and an adaptable non-uniform Rake filter extracts delay information from each selected Rake filter coefficient and to configure structure of non-

uniform tap delay filters (In Dent, see col. 4, lines 53-65. The conjugate of a(k) is the filter's coefficients derived from the channel tap coefficients. The channel tap coefficients contain information regarding the amplitude and phase shifts of the propagation path "channel" that the received signal traveled. Therefore, according to equation 4 & 5, the filters coefficients are able to extract this information from the channel tap coefficients so as to compensate for the channel impairments. Furthermore, these coefficients are used mainly to adaptively and iteratively update the parameters in the filter.), and wherein the adaptable non-uniform Rake filter to combine the one or more channel components with associated delay information using the configured adaptable non-uniform Rake filter and to output the channel matched signal. (In Khayrallah, see fig. 1. Furthermore, one skilled in the art would know that the filter coefficients are used to compensate for multi-path interferences, and that the output of the rake combiner is a channel matched signal.)

Claim 16 has been analyzed and rejected w/r to claim 9 above.

Claim 17 has been analyzed and rejected w/r to claim 6 above.

Claim 18 has been analyzed and rejected w/r to claim 7 above.

Claim 19 is a method claim corresponding to system claim 5. Hence, the elements in system claim 5 would have necessitated the steps performed in method claim 19. Therefore, claim 19 has been analyzed and rejected w/r to claim 5.

Claim 20 is a method claim corresponding to system claim 3. Hence, the elements in system claim 3 would have necessitated the steps performed in method claim 20. Therefore, claim 20 has been analyzed and rejected w/r to claim 3.

Claim 21 is a method claim corresponding to system claim 8. Hence, the elements in system claim 8 would have necessitated the steps performed in method claim 21. Therefore, claim 21 has been analyzed and rejected w/r to claim 8.

Claim 22 is a method claim corresponding to system claim 7. Hence, the elements in system claim 7 would have necessitated the steps performed in method claim 22. Therefore, claim 22 has been analyzed and rejected w/r to claim 7.

Claim 23 has been analyzed and rejected w/r to claim 5 above.

Claim 24 has been analyzed and rejected w/r to claim 3 above.

Claim 25 has been analyzed and rejected w/r to claim 8 above.

Claim 26 has been analyzed and rejected w/r to claim 7 above.

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leon Flores whose telephone number is 571-270-1201. The examiner can normally be reached on Mon-Fri 7-5pm Alternate Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

LF
March 20, 2007

David Payne
DAVID C. PAYNE
SUPERVISORY PATENT EXAMINER